Ferroelectricity Newsletter

A quarterly update on what's happening in the field of ferroelectricity

Volume 13, Numbers 3&4 Summer/Fall 2005

YEAR-END REPORT OF NEWS IN THE FIELD

The **17th International Symposium on Integrated Ferroelectrics** (ISIF 2005) took place from 17-20 April 2005 in Shanghai, China. The field of ferroelectric/piezoelectric/high-K dielectric/phase-change materials is growing rapidly because of the potential application in MEMS technologies and the development of new generations of nonvolatile memory devices. Please check the index of the papers, starting on page 2 of this issue, to see that the presentations reflect the maturity and the acceptance of the technology.

The other set of papers indexed in this issue is from the **NATO Advanced Research Workshop on dimensionality effects and non-linearity in ferroics**, held on 19-22 October 2004 in Lviv, Ukraine. (Please see pages 24 ff.)

The **18th International Symposium on Integrated Ferroelectrics** (ISIF 2006) will be held on 23 - 27 April 2006 in Honolulu, Hawaii. You will find information, including a detailed description on the technical program, beginning on page 27.

The other announcement about upcoming meetings deals with the **8th European Conference on Applications of Polar Dielectrics** (ECAPD 8) to take place from 5 - 8 September 2006 in Metz, France. Topics of this conference include materials research, application oriented studies of physical properties of dielectrics, and device research, such as piezoelectric transducers, smart sensors and actuators, pyroelectric detectors, electro-optic modulators, spatial light modulators and displays, 2D and 3D optical storage devices, ferroelectric memories, and microelectromechanical devices.

As of this moment, future funding for the *Ferroelectricity Newsletter* is uncertain. This issue will therefore be the last we publish as hard copy. We will try, however, to keep our website open. This allows you continued access to all archived material. Since the future of our Ferroelectricity Newsletter is not yet defined, we encourage all of you to email us your thoughts and suggestions. In turn, we keep you posted on any new development.

We thank all of our readers for your loyal support these past 13 years, as well as the Naval Postgraduate School and the Office of Naval Research for making it possible to produce this newsletter.

Our very best wishes for your continuing successful professional career.

Rudolf Panholzer
Editor-in-Chief

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FRAM reliability issues and improvement for advanced FRAM
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Effects of novel electrodes for thin $Pb(Zr,Ti)O_3$ films by controlling PZT interface
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Integration processes and properties of semiconductive oxide memory transistor
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Polarization instability of Pt/PZT/Pt ferroelectric capacitor invoked by voltage cycling
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Effect of in-plane orientations and strain on electrical properties of (111)-oriented tetragonal PZT thin

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Chung-Sik Kim, Jong-Ho Park, Dae-Hwang Yoo, Kyong-Soo Hong, Ho-Soon Yang, Byung Kee Moon, Hyo-Jin Seo, Byung-Chun Choi, Su-Tae Jung, Yong-Il Kim, and Kwon-Sang Ryu

A new method to characterize a relative volume to the C-domain in PZT films based on the Raman spectra
Ken Nishida, Syunshuke Wada, Minoru Osada, Shoji Okamoto, Risako Oeno, Hiroshi Funakubo, and Takashi Katoda

Low dielectric constant and hydrophobic nanoporous silica films
Jun Shen, Lanfang Yao, Zhaofeng Wu, Guangming Wu, Bin Zhou, and Xingyuan Ni

Wake-up effect: Self-consistant motion of single domain wall in gadolinium molybdate
V. Shur, E. Nikolaeva, E. Shishkin, I. Baturin, A. Shur, D. Lupascu, and T. Utschig

Evolution of ferroelectric domains, induced by chemical etching in stoichiometric MgO:$LiTaO_3$
V. Ya. Shur, A.I. Lobov, A.G. Shur, S. Kurimura, Y. Nomura, K. Terabe, X.Y. Lu, and K.

ISIF 2005 PAPERS

Kitamura

Role of nano-scale nonpolar inclusions in polarization reversal in relaxor PZT ceramics
V. Ya. Shur, E.L Rumyantsev, G.G. Lomakin, O.V. Yakutova, E.V. Nikolaeva, D.V. Pelegov, A. Sternberg, and M. Kosec

Phase stability after an electric-field poling in high-strain ferroelectric $Pb(Mg_{1/3}Nb_{2/3})_{1-x}Ti_xO_3$ (PMNTx%) crystals
Chi-Shun Tu, F.-T. Wang, R.R. Chien, and V.H. Schmidt

Electrical characteristics of Au-nanocrystals embedded in metal-oxide-semiconductor structures
Chan-Chen Wang, Jiun-Yi Tseng, and Tai-Bor Wu

Structures and properties of barium strontium titanate nanoparticles synthesized by a hydrothermal method
Ji Liu. Di Wu, Yu Deng, Aidong Li, and Naiben Ming

Studies on the characterization of the SnO_2 nanowires growth
Ming-Ju Yang and Sheng-Yuan Chu

Heteroepitaxial growth of the ferroelectric $Pb(Zr_{0.2}Ti_{0.8})O_3$ thin films on $SrRuO_3/SrTiO_3$ structures for nano-data storage
Woo-Sung Lee, Kyoung-Chan Ahn, Nak-Jin Seong, and Soon-Gil Yoon

Finite size effects on the structural and physical properties in $BaTiO_3$ and $SrTiO_3$ nanocrystals
Jian Yu and Junhao Chu

Local elasticity response in ferroelectric crystals studied by AFM-based novel probe techniques
H.F. Yu, H.R. Zeng, R.Q. Chu, G.R. Li, H.S. Luo, and Q.R. Yin

Controlled 1dimensional nanostructures of $PbTiO_3$: From nanoparticles to nanotubes
Lili Zhao, Martin Steinhart, Jian Yu, Jun Shen, Eckhard Pippel, Petra Göring, Martin Alexe, and Ulrich Gösele

Lithium niobate and doped lithium niobate nanoshell tubes by high-temperature melts wetting
Lili zhao, Martin Steinhart, Jun Shen, Jian Yu, Petra Göring, Herbert Hofmeister, Marin Alexe, and Ulrich Gösele

Phase transition in $Pb(Mg_{1/3}Nb_{2/3})_{0.67}Ti_{0.33}O_3$ single crystal
Peng Bao, Feng Yan, Xiaomei Lu, Huimin Shen, Jingsong Zhu, and Yening Wang

SPM imaging of domains in periodically poled $LiTaO_3$ crystals
Yi Kan, Xiaomei Lu, Peng Bao, and Jingsong Zhu

Self-assembly of bismuth oxide nanostructure using the metal-organic decomposition method
J. Ma, Y. Kan, X.M. Lu, and J.S. Zhu

Ferroelectric nanotubes as [3D] DRAM and FRAM self-trenched capacitors
F.D. Morrison, M. Mikaye, V.M. Kugler, and J.F. Scott

Nanoscale piezoelectric and elastic phenomena of ferroelectric domain
H.F. Yu, R.Q. Chu, G.R. Li, H.S. Luo, and Q.R. Yin

The preceding papers were delivered at the
17TH INTERNATIONAL SYMPOSIUM ON INTEGRATED FERROELECTRICS (ISIF 2005)
In addition, five **tutorial sessions** were held:

- Fundamentals of FeRAM circuit design architecture, device modeling
  Shoichi Matsui (Fujitsu)
- High density FeRAM process integration
  Dirk Wouters (IMEC)
- Materials for MEMS and ferroelectric memories, ferroelectric nanostructures, and multi-ferroics
  Marin Alexe (Max Planck)
- The measurement methodology of ferro-component and testing technique of FeRAM as well as ferroelectric device physics
  Jason Chen (Symetrix Corporation)
- Ferroelectric and electrode fabrication for 3D structures - MOCVD
  Hiroshi Funakubo (Tokyo Institute of Technology)

ARW PAPERS

DIMENSIONALITY EFFECTS AND NON-LINEARITY IN FERROICS

This NATO Advanced Research Workshop was held in Lviv, Ukraine, on 19 - 22 October 2004. The proceedings were published in two volumes of the international journal **FERROELECTRICS** (Volumes 316 and 317, 2005), guest edited by André Perrin (France) and Ihor Stasyuk (Ukraine). In their editorial they say, "We also considered it (the workshop) as a continuation of a series of open Ukrainian-French meetings on ferroelectrics physics; two previous such meetings were held in Kyiv, Ukraine, in 2000 and in Dinard, France, in 2002. We are very pleased to say that above 80 participants from nine countries attended this Workshop."

Special attention was paid to ferroic materials with low dimensionality (thin films and nanosize objects), relaxors, spin glasses, as well as nonlinear phenomena in ferroelectric systems, related to domain walls motion, external field influences, disorder, and others.

Eight invited speaker lectures and 30 contributed oral presentations were delivered. A poster session was held with 48 presentations given. The latest achievements in technology for the film growth by pulsed laser deposition permit a control of the thin film/nanosize system fabrication on anatomic scale and thus obtain objects with the properties set on demand. The problems related to an improvement of the quantitative characteristics of the low-dimensional ferroic materials, in particular, growth control methods, purity of the materials, decrease of their dielectric losses, polarization fatigue, and ageing of their relevant physical characteristics were of substantial interest during the Workshop. So were principal questions for theory and technology, such as size dependencies of the ferroelectric characteristics of nano objects/films and fundamental limitations for their geometrical dimensions, such as critical thickness for thin film ferroelectricity. Unusual effects were reported, e.g., observation of the ferroelectric properties of nanocrystals and thin film heterostructures identical to those of bulk crystals. Theoretical approaches to description of thin film behavior, taking into account depolarization fields, substrate misfit strains surface tension, and gradients of volume free energy density were also presented.

Extensive discussion focused on the properties of ferroic materials driven by the domain walls system, manifesting complicated dependences on temperature, time, frequency, and pressure. Attention was paid to a complex domain wall dynamics with the pinning effect at impurities chaotic switching phenomena and stochastic resonance in ferroelectrics, field-induced reconstruction of nano-scale domain structures in ceramics, and ferroelastic twinning.

Finally, the following topics were under consideration: disordered relaxor ferroelectrics, polycrystalline, ceramic (with nanosized grains or dispersed nanosize ferroelectric particles), polymer and glassy materials; nonlinear dielectric, elastic, optical, and piezoelectric properties of ferroelectrics; phase transitions, external pressure and field effects nonlinearities in external fields, and domain phenomena in such systems.

Depolarization field in thin ferroelectric films with account of semiconductor electrodes
M.D. Glinchuk, B.Y. Zaulychny, and V.A. Stephanovich

Ferroelectric thin films for applications in high frequency range
A. Rousseau, M. Guilloux-Viry, V. Bouquet, A. Perrin, G. Tanné, F. Huret, J.F. Seaux, D. Cros, and V. Madrangeas

Dimensional effects on ferroelectrics: Ultra-thin single crystals, nanotubes, nano-rods, and nano-ribbons
J.F. Scott

Field induced evolution of nanoscale structures in relaxor PLZT ceramics
V.Ya. Shur, E.L. Rumyantsev, G.G. Lomakin, O.V. Yakutova, D.V. Pelegov, A. Sternberg, and M. Kosec

Dielectric and pyroelectric response of $BaTiO_3$-PVDF nanocomposites
B. Hilczer, J. Kulek, M. Polomska, M.D. Glinchuk, A.V. Ragulya, and A. Pietraszko

Size effects in $BaTiO_3$ nanopowders studied by EPR and NMR
E. Erdem, R. Boettcher, H.-J. Glaesel, E. Hartmann, G. Klotzsche, and D. Michel

Theory of Rochelle salt: Beyond the

ARW PAPERS

Mitsui model
I.V. Stasyuk and O.V. Velychko

Temperature dependence of the non-linearity coefficient of strontium titanate
J. Dec, W. Kleemann, and M. Itoh

Chaos and stochastic resonance in ferroelectrics—Two effects related to switching
M. Distelhorst

Epitaxial regrowth of ferroelectric thin films on bottom electrodes
A. Perrin, A. Rousseau, J.R. Duclère, and M. Guilloux-Viry

Thickness dependence of random field distribution in thin films made of disordered ferroelectrics
V.A. Stephanovich, E.V. Kirichenko, J. Drózdz, and H. Drózdz

Effective dielectric function in high-permittivity ceramics and films
J. Petzelt and I. Rychetsky

Compositional and pressure effects on the phase transition in ferroelectric $NH_4H(ClH_2CCOO)_2$
M. Zdanowska-Fraczek, R. Jakubas, and P. Czarnecki

The effect of isotopic and isovalent impurity on low and infra-low frequency dielectric response of the TGS and RS model crystals
A.V. Shilnikov, V.A. Fedorikhin, and N.V. Ratina

Spin models with different types of competing interactions
R.R. Levitskii, S.I. Sorokov, and A.S. Vdovych

EPR of LGO:Cu^{2+} crystals
M.P. Trubitsyn, M.D. Volnianskii, and A. Yu. Kudzin

Phases coexistence of hydrogen-bonded $K_{1-x}(NH_4)_xH_2PO_4$ crystal
Z. Trybula, J. Kaszynski, and H. Maluszynska

Structural studies of relaxor/ferroelectric $Pb(Mg_{1/3}Nb_{2/3})O_3$/$PbTiO_3$ superlattices
H. Bouyanfif, N. Lemée, M. El Marssi, F. Le Marrec, B. Dkhil, and M.G. Karkut

Localized polaron type states in ferroelectrics-ferroelastics
M.B. Belonenko and E.V. Demushkina

Transmission and dispersion of refractive indices in nonlinear optical $CsLiB_6O_{10}$ single crystals
V.T. Adamiv, Ya.V. Burak, M.M. Romanyuk, G.M. Romanyuk, and I.M. Teslyuk

Band energy structure and optical properties of Ag_2CdI_4 superionic compound
I. Bolesta, V. Savchyn, and S. Velgosh

Deposition of PZT thin films on polymer substrate by means of low pressure plasma jet system
A. Deyneka, Z. Hubicka, L. Jastrabik, M. Cada, P. Virostko, J. Olejnicek, G. Suchaneck, and G. Gerlach

Randon field based model for calculation of the properties of relaxor ferroelectric thin films
E.A. Eliseev and M.D. Glinchuk

Critical behaviour of $Sn_2P_2S_6$ ferroelectric crystals under high pressure
P.P. Guranich, A.G. Slivka, V.S. Shusta, O.I. Gerzanich, and I.Yu. Kuritsa

$Ba_xSr_{1-x}TiO_3$ thin films deposited by RF hollow cathode plasma jet technique
Z. Hubicka, J. Olejnícek, M. Cada, P. Virostko, H. Sichová, A. Deyneka, and Z. Czapla

Phase transitions in Ag_2CdI_4: Electrical studies
Ivan Karbovnyk

On the plasma transitions in ferroelectric-antiferroelectric mixed systems
N.A. Korynevskii and V.B. Solovyan

Critical behaviour of 3D systems in the external field
M.P. Kozlovskii

Piezoelectric resonance and sound attenuation in Rochelle salt
A.P. Moina, R.R. Levitskii, and I.R. Zachek

Theoretical description of coercive field decrease in ferroelectrics-semiconductors with charged defects
Anna N. Morozovska

Analytic method of calculating thermodynamic functions for Ising-like system in an external field
I.V. Pylyuk, M.P. Koslovskii, and O.O. Prytula

Lead-free relaxor ferroelectric ceramics in $NaNbO_3$-$Sr_{0.5}NbO_3$-$LiNbO_3$ solid solution system
S.I. Raevskaya, J.-L.

ARW PAPERS

Dellis, L.A. Reznichenko, S.A. Prosandeev, I.P. Raevski, S.O. Lisitsina, and L. Jastrabik

Linear versus nonlinear field dependence of dielectric stiffness in relaxors
I.P. Raevski, S.A. Prosandeev, A.S. Emelyanov, Eugene V. Colla, J.-L. Dellis, M. El Marssi, and L. Jastrabik

Inversion of the sign of birefringence and its application in thermometry
M.O. Romanyuk and M.M. Romanyuk

The baric changes of the electron polarisability of $LiRbSO_4$, $LiKSO_4$ and $(NH_4)_2BeF_4$ crystals
V.Yo. Stadnyk and M.O. Romanyuk

Lattice dynamics simulation of CsH_2PO_4 crystal
Ya. Shchur

Linear thermal expansion of ferroelectric deuterated triglycine sulphate
I.S. Girnyk, O.S. Kushnir, and R.Y. Shopa

Optical activity of the KDP group crystals
Y. Shopa, L. Lutsiv-Shumskiy, and R. Serkiz

Temperature and pressure effect on the absorption edge in $(Sn_{0.95}Zn_{0.05})_2P_2S_6$ crystal
V.S. Shusta, V.V. Tovt, A.G. Slivka, P.P. Guranich, E.I. Gerzanich, and I.Y. Kuritsa

Pressure effect on $Sn_2P_2Se_6$ type incommensurate crystals
A.G. Slivka, V.M. Kedyulich, and E.I. Gerzanich

The refractive properties of uniaxially stressed doped TGS crystals
V.Yo. Stadnyk and M.O. Romanyuk

Exact and variational treatment of ferroelectric thin films with different materials of electrodes
V.A. Stephanovich, M.D. Glinchuk, and V.Y. Zaulychny

The effect of axial pressure on domain state and dielectric properties of $Na_{0.5}Bi_{0.5}TiO_3$ and related materials
J. Suchanicz and T.V. Kruzina

Hydrostatic pressure dependence of T_c for SASD type crystals
I.E. Lipinski, J. Kuriata, and N.A. Korynevskii

Luminescence of ferroelectric $CsPbCl_3$ nanocrystals
A. Voloshinovskii, S. Myagkota, and R. Levitskii

Ferroelectric thin film self-polarization induced by mismatch effect
M.D. Glinchuk and A.N. Morozovska

Ferroelectricity Newsletter

including all back issues is available on Internet

http://www.sp.nps.navy.mil/projects/ferro/ferro.html

in Adobe Acrobat PDF file format

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Contact:

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UPCOMING MEETINGS

18th International Symposium on Integrated Ferroelectrics (ISIF 2006)
23 - 27 April 2006
Honolulu, Hawaii, USA

In 2006, ISIF will return to the United States to be held in Honolulu, Hawaii, on the beautiful beaches of Waikiki. This meeting will be particularly exciting as we have entered a phase in which we are seeing more and more FeRAM devices in production.

As interest in this field continues to grow, it remains the goal of the ISIF organization to uphold its repudation as a premier conference and source for information in the ferroelectric field. To accomplish this goal for ISIF 2006, we are offering the opportunity for select companies to participate in the International Symposium on Integrated Ferroelectrics 2006 as sponsors.

ISIF is offering several benefits to participating sponsors. Your company may elect to provide a $2,000 or $3,000 sponsorship or you may choose to sponsor an event such as the Welcome Reception, the Conference Luncheon, or the Banquet Dinner for $5,000. Please visit our Web site for details.

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- Prof. Rudy Panholzer, Naval Postgraduate School
- Dr. Orlando Auciello, Argonne National Lab

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- Prof. T.W. Noh, SNU (twnoh@snu.ac.kr)

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Symposium Coordinator:
- Kerry Baugh, University of Colorado at Colorado Springs (kerry@isif.net)

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Technical Program
Plenary Speakers:
- Prof. Dennis Polla (DARPA program manager and University of Minnesota)
  " Directions for ferroelectric MEMS and NEMS for defense applications"
- Dr. Kinam Kim (President, Samsung Semiconductor Division)
  "Memory research programs at Samsung"
- Dr. Greg Atwood (Intel)

UPCOMING MEETINGS

Session 1: **Device Process Integration/Reliability (Ferro-, Piezo-, Pyro-electrics, etc.)**
(a) Circuit Design and Architecture
(b) Modeling (Spice, etc.)
(c) Processing and Reliability of FeRAMs, Sensors and Actuators, and Devices for Medical Applications

Session Chairs:
Dr. S.K. Hong (Hynix)
Dr. J.S. Cross (Fujitsu)

Invited Speakers:
- K. Yamakawa (Toshiba), "Key process for high density 0.13um FeRAM and beyond"
- S.-H. Kim (INOSTEK), "The long-term reliability of BFO-PZT ferroelectric thin films for RF-embedded FeRAM devices"
- D. Hadnagy (Consultant), "Intrinsic and extrinsic issues associated with the reliability of FRAM"

Session 2: **Alternative Nonvolatile Memory Technologies**
(a) Nonoxide based Phase Change Memory (or PCRAM)
(b) Oxide based Resistive Probe Storage (or RRAM)
(c) Magnetic (or MRAM)

Session Chairs:
Prof. B.H. Park (Konkuk University)
Prof. M. Kawasaki (Tohoku University and CERC)

Invited Speakers:
- S.A. Seo (Samsung Advanced Institute of Technology), "Resistance change of NiO for nonvolatile memory application"
- M. Kozicki (Arizona State University), "A review of solid electrolyte memory"
- S. Parkin (IBM), "A storage class memory: The magnetic racetrack"
- I. Meijer (IBM Zürich Research Lab), "A candidate for nonvolatile memory"

Session 3: **Integrated FE Liquid Crystals & Organic-FE Structures**
Session Chair:
Prof. S. Lagerwall (Chalmers University)

Invited Speakers:
- D. Kruerke (CRLO Displays Limited), "Ferroelectric liquid crystal on silicon microdisplays and their applications"
- M. Wand (LC Vision, Boulder, CO) "Germanium-containing ferroelectric liquid crystals for improved display performance"

Session 4: **Integrated Microwave Materials and Devices**
Session Chairs:
Prof. G. Subramanyam (University of Dayton)
Prof. S. Baik (Postech)

UPCOMING MEETINGS

Invited Speakers:

- R. Biggers (AFRL, USA), "Integrated BST thin films through process-controlled pulsed-laser deposition"
- T.-B. Wu (National Tsingua University, Taiwan), "Interfacial varactor characteristics from interdiffusion in the ferroelectric thin films deposited on high-resistivity Si"

Session 5: **High K Films in Packaging, DRAMs, and CMOS**
Session Chairs:
Prof. R. Waser (RWTH Aachen)
Prof. P.C. McIntyre (Stanford University)

Invited Speakers:

- P. Majhi (Intel), "A materials perspective of challenges and opportunities for future generation CMOS devices"
- J.D. Baniecki (Fujitsu Laboratories), "High performance barium strontium titanate thin film capacitors for low inductance decoupling applications"
- X. Guo (University of Florida), "Defect chemistry of $SrTiO_3$: From bulk materials to thin films of nanometer thickness"
- S. Stemmer (UC Santa Barbara), "Scanning transmission electron microscopy of high-k gate stacks for CMOS"

Session 6: **FeRAM Materials (PZT, SBT, BLT, $BiFeO_3$, etc.)**
(a) Thin-Film Processing
(b) Materials Characterization
Session Chairs:
Prof. R. Katiyar (University of Puerto Rico)
Prof. M. Shimizu (University of Hyogo)

Invited Speakers:

- H. Funakubo (Tokyo Institute of Technology), "Development of low voltage-saturated polycrystalline PZT film"
- L. Eng (Dresden University), "Nanoscale electronic and optical properties in ferroic materials"
- Z.G. Liu (Nanjing University), "Dynamic behavior of domain switching and the mechanism of the fatigue phenomenon in SBT and BLT thin films"

Session 7: **MEMS, Pyroelectric/IR, Optoelectronic Materials**
(a) Thin-Film Processing
(b) Materials Characterization

Session Chairs:
Prof. J. Lee (Sungkyunkwan University)
Dr. Q. Zhang (Cranfield University)

Invited Speakers:

- T.S. Kim (KIST, Korea), "MEMS devices using piezoelectric thin and thick films"
- H.M. Jang (POSTECH), "Structure and magnetoelectric (ME) coupling properties of $BiFeO_3$-based thin films and single crystals"

UPCOMING MEETINGS

Session 8: **Materials Modeling/Theory**
(a) Domains
(b) Domain Dynamics in Films

Session Chairs:
Dr. A.K. Tagantsev (Swiss Federal Institute of Technology)
Prof. N. Valanoor (Univeristy of New South Wales, Australia)

Invited speakers:
- I. Lukyanchuk, "Thermodynamic and electrical properties of ferroelectric domains in films"
- S.K. Streiffer (Argonne National Lab), "*In-situ* synchroton X-ray scattering studies of ferroelectric behavior in epitaxial PZT films"

Session 9: **Multi-Ferroic/Magnetoelectric Films**
Session Chairs:
Prof. R. Ramesh (University of California at Berkeley)
Prof. M. Okuyama (Osaka University)

Invited Speakers:
- G. Srinivasan (Oakland University), "Ferromagnetic-ferroelectric layered structures for microwave signal processing"
- H. Tabata (Osaka University), "Multi-ferroic relaxors"

Session 10: **Ferroelectrics under Restricted Geometries**
(e.g., Superlattices, Nanorods, Nanodots, Ultrathin Films/Crystals
Session Chairs:
Dr. M. Alexe (Max Planck Institute)
Prof. J.-M. Triscone (University of Geneva)

Invited Speakers:
- E. Mishina (Montana State), "Ferroelectric dots and two-dimensional nanostructure: From technology and physics to applications"
- H. N. Lee (Oak Ridge National Lab), "Strain and ferroelectricity in artificially designed superlattices and ultra-thin PZT films"
- M. Gregg (Queens University, Belfast), "Ferroelectric behavior in free-standing single crystal 'thin films' and 3D nanoshapes made with a focused ion beam microscope"
- M. Dawber (University of Geneva), "Controlling ferroelectricity in $PbTiO_3/SrTiO_3$ superlattices"

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UPCOMING MEETINGS

8th European Conference on Applications of Polar Dielectrics (ECAPD 8)
5 - 8 September 2006
Metz, France

The conference will be organized by the "Laboratoire Matériaux Optiques, Photonique et Systèmes" (LMOPS) associated with the University of Metz, Supélec, and the Centre National de la Recherche Scientifique (CNRS) with the collaboration of the Ecole Nationale Supérieure d'Arts et Métiers (ENSAM).

Topics

- Material research

  Single crystals, thin films, ceramics, polymers, composites and liquid crystals, processing and fabrication technologies

- Application-oriented studies of physical properties of dielectrics

  Ferro-, piezo-, and pyroelectric properties, electro-optical and nonlinear optical effects, photorefractivity and photoconductivity, ultrasonics, high Tc superconductivity, ionic conductivity, microstructure related properties, domain engineering

- Device research

  Piezoelectric transducers, smart sensors and actuators, pyroelectric detectors, electro-optic modulators, spatial light modulators and displays, 2D and 3D optical storage devices, optical signal processors, optical frequency converters, integrated optical devices, nonlinear photonic bandgaps, periodically poled ferroelectric devices, ferroelectric memories, microelectromechanical systems

Location

The conference will take place at Metz-Technopole. The historical city of Metz in the north-east of France is easily reachable from Paris and Frankfurt (Germany) in about three hours train travel. Luxembourg International Airport with frequent flights to all major European cities is 70 km north of Metz and easily available by public transportation.

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CALENDAR OF EVENTS 2006

Apr 23-27	•	18th International Symposium on Integrated Ferroelectrics (ISIF 2006), Honolulu, Hawaii, USA (see p. 27)
Jun 18-22	•	Electroceramics X, Toledo, Spain. Contact: http://electro-x.etsit.upm.es
Sep 5-8	•	8th European Conference on Applications of Polar Dielectrics ECAPD 8), Metz, France (see p. 31)